PROPOSAL FOR EXPERIMENT AT RCNP
— Director's Beam time —

12 March 2004

TITLE:
Measurement of recoil momentum distribution for $1p_{3/2}$ state in ^{6}Li$(p,2p)^{5}$He Reactions

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EXPERIMENTAL GROUP:

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Yasuda, Y.	Kyoto U.	D3	Terashima, S	Kyoto U.	D1
Wakasa, T	Kyushu U.	AP	Ishida, T.	Kyushu U.	D2
Asaji, S.	Kyushu U.	M2	Hagiwara, Y.	Kyushu U.	M1
Kawabata, T.	CNS	RA			

RUNNING TIME: Data runs 1.0 days
BEAM LINE: Ring : WS course
BEAM REQUIREMENTS:

Type of particle	polarized proton
Beam energy	392 MeV
Beam intensity	$\geq$ 600 nA
Energy resolution	400 keV

BUDGET:

Travel expenses	0.1M yen
Slits for GR and LAS	0.4M yen

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Description of Proposal

We have measured differential cross sections and analyzing powers(A_y) for (p,2p) reactions for several orbits of s,p and d-shell nuclei ^{40}Ca, ^{12}C and ^{6}Li at 392MeV. In order to examine the reliability of DWIA calculations, measurements have been performed for various kinematics [1].

A part of data is shown in Fig. 1. The triple differential cross section and A_y of ^{12}C(p,2p) reaction leading to the $1p_{3/2}$ state of the residual ^{11}B nucleus are shown as a function of the recoil momentum. The dashed and solid lines are DWIA calculations corresponding to two different optical potentials. DWIA calculations qualitatively reproduce experimental data. Similar agreements are obtained for ^{12}C and ^{40}Ca nuclei. Obtained spectroscopic factors are consistent with those from (e,$e'p$) reactions within 20% [1].

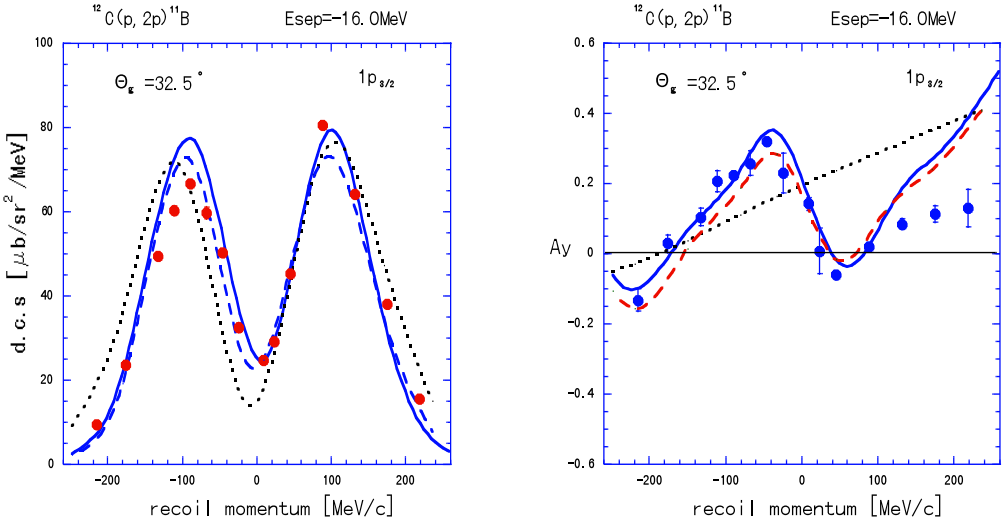

Figure 1: Triple differencial cross section and analyzing power for $1p_{3/2}$ knock-out ^{12}C(p,2p) reaction at E_p=392 MeV. The cross section shows a minimum at zero recoil.

Figure 2 shows results for ^{6}Li(p,2p) reactions. DWIA calculations cannot reproduce the cross section for the $1p_{3/2}$ proton knock-out at all. DWIA predicts a minimum at 0 MeV/c, but the experimental data have a peak there. This result differs from that of (e,$e'p$) reactions [2, 3].

In the previous experiment, the width of the recoil momentum on each point was about $\pm$ 35 MeV/c. In this proposal, we will measure the differential cross sections at 0 - 50MeV/c region within $\pm$10MeV/c width with smaller slits which are 0.8 msr for GR and 0.9 msr for LAS. We assume the cross section of 150 - 250 μb/sr^2/MeV. Statistical error is expected to be 3% with 20 mg/cm^2 target thickness and the beam intensity of 600nA. For each setting, 3 - 4 hours are required measurement.

We want to measure for 6 - 9 setting and request one day for this experiment.

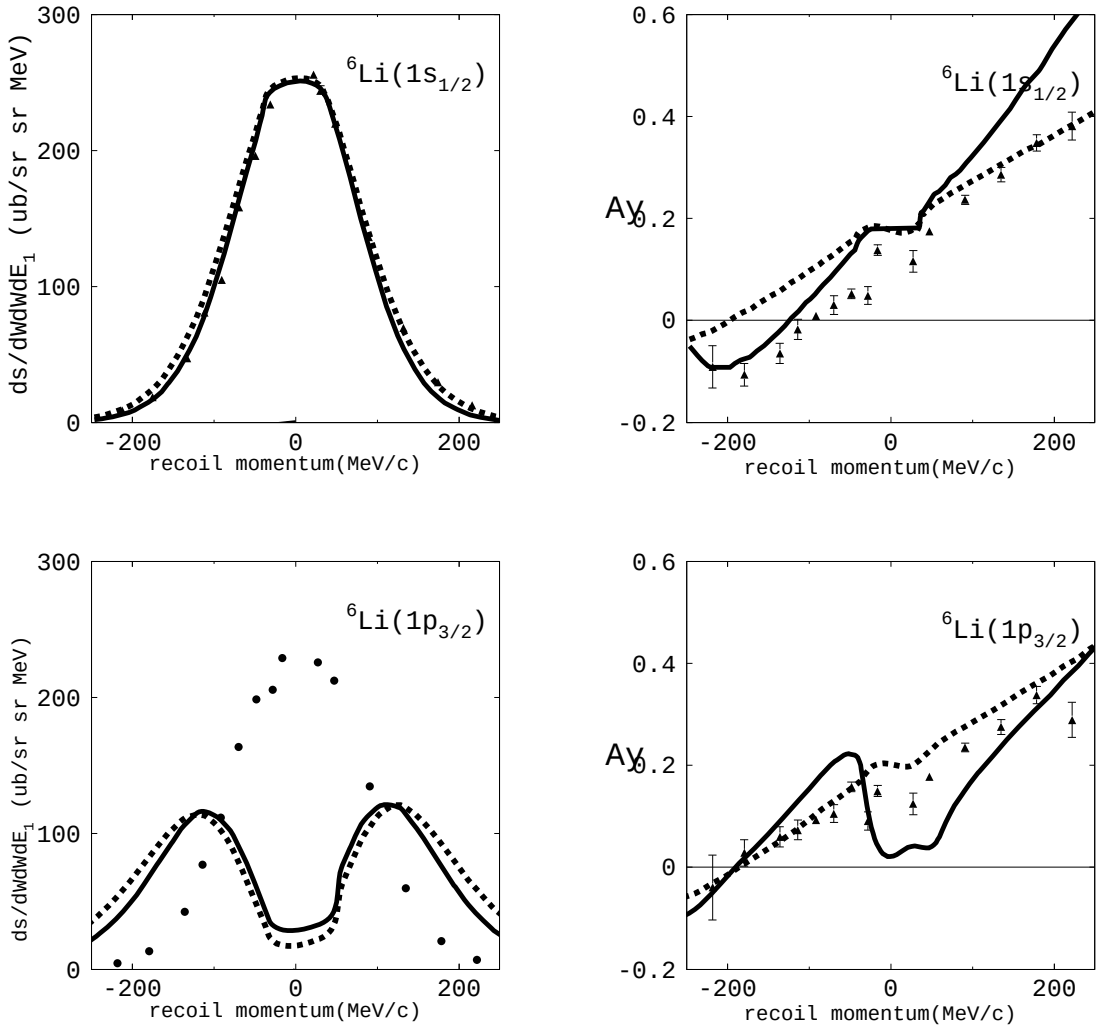

Figure 2: Experimental data for the $1s_{1/2}$ knock-out(upper) and $1p_{3/2}$ knock-out(lower) ^{6}Li(p,2p) reactions at E_p=392 MeV

References

[1] E. Obayashi *et al.*, RCNP Annual Report. (1998)

[2] K. Nakamura *et al.*, Nucl. Phys. **A296** 431 (1978)

[3] Yu. P. Antoufiev *et al.*, Phys. Lett. **42B** 347 (1972)